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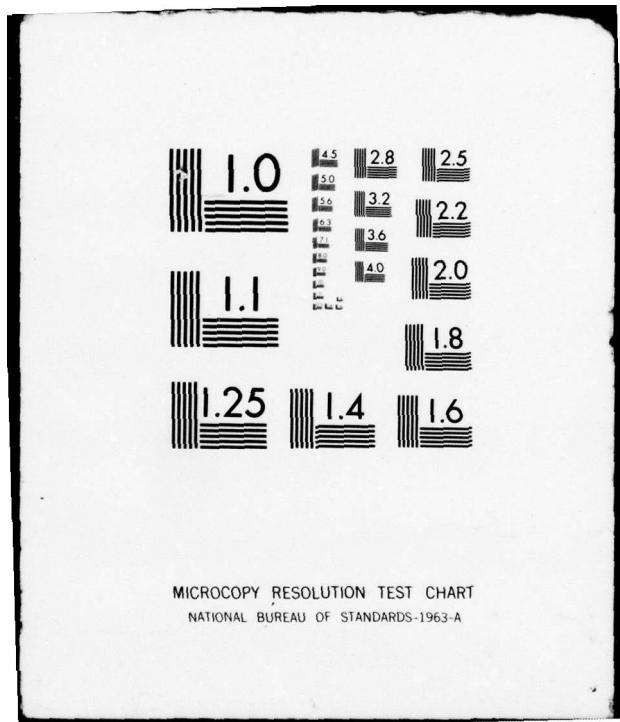
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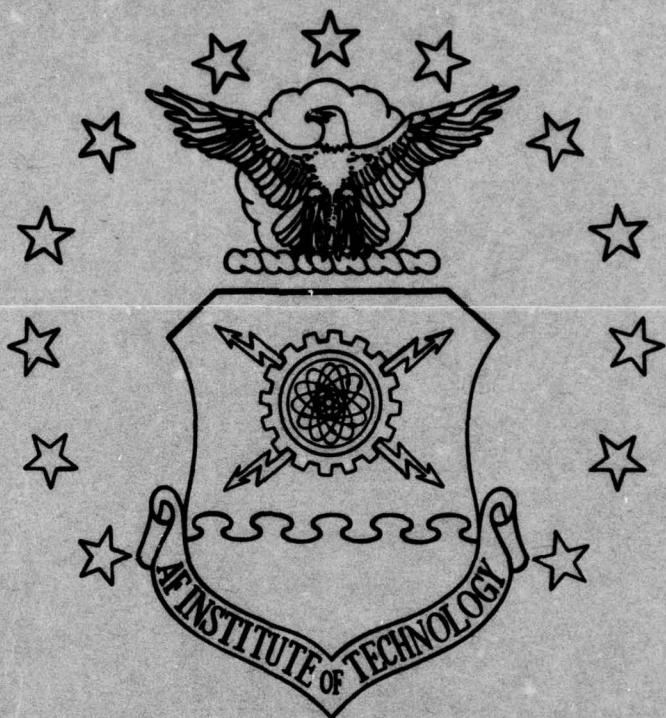
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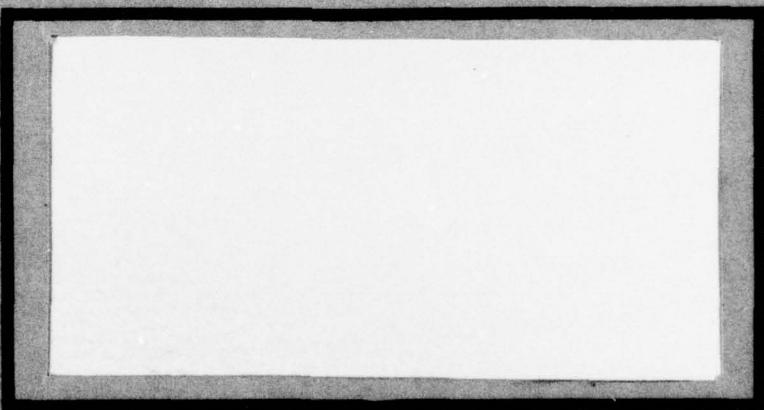
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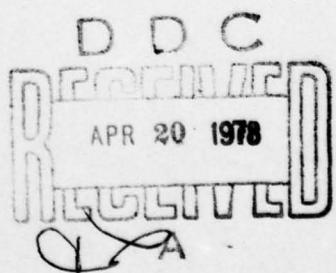
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POLICY CAPTURING APPLIED TO THE  
MASLOW NEED HIERARCHY

THESIS

AFIT/GSM/SM/77D-23

Richard L. Lamontagne  
Captain USAF



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the next higher need emerges. Regression analysis is used to determine the relative weights that a subject places on each of the need levels and analysis of variance is used to determine if any interactions of the cues are perceived. Some of the results of these analyses were: most subjects emphasized self growth and autonomy in their evaluation of the desirability of a job; many subjects had a moderate importance on a need that was nonadjacent to a need that had a primary importance; and most NCOs are consistent and linear in their decision making behavior. The major implications of the findings were: Maslow's hierarchy is not a hierarchy at all and NCOs want to use their full potential in their jobs.

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POLICY CAPTURING APPLIED TO THE  
MASLOW NEED HIERARCHY

THESIS

Presented to the Faculty of the School of Engineering  
of the Air Force Institute of Technology  
Air University  
in Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science

by

Richard L. Lamontagne  
Captain USAF

Graduate Systems Management

December 1977

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## PREFACE

This thesis addresses some questions about the hierarchy of human needs developed by Abraham H. Maslow and provides some insight on the decision making behavior of Air Force Senior Noncommissioned Officers (NCO). Hopefully, the results will be of value, both to those who are interested in Maslow's theory of human needs and to those who are interested in NCO decision making behavior.

I would like to express my greatful appreciation to Dr. Adrian M. Harrell, my advisor, whose constant support and guidance were a source of encouragement for this study. To Dr. G. C. Saul Young, my reader, for his advice on Maslow's hierarchy of human needs, and to Dr. Charles W. McNichols for his advice on interpreting the statistical results, I give my deepest thanks. My appreciation also goes to Lieutenant Colonel Duane Hopkins of the Air Force Senior Noncommissioned Officer Academy for his aid in collecting the data.

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## ABSTRACT

The purpose of this study was to address some questions that Maslow's hierarchy suggests and to provide some insight into the decision making behavior of NCOs. To accomplish this, 234 NCOs completed a decision making exercise, based on policy capturing. The cues in the decision making exercise were a modified set of Maslow's hierarchy of human needs. The needs used in the exercise were: security, affiliation, esteem, autonomy, and self growth. Maslow hypothesized that the hierarchy was governed by a satisfaction-importance relationship. As a need is satisfied, it recedes in importance and the next higher need emerges. Regression analysis is used to determine the relative weights that a subject places on each of the need levels and analysis of variance is used to determine if any interactions of the cues are perceived. Some of the results of these analyses were: most subjects emphasized self growth and autonomy in their evaluation of the desirability of a job; many subjects had a moderate importance on a need that was nonadjacent to a need that had a primary importance; and most NCOs are consistent and linear in their decision making behavior. The major implications of the findings were: Maslow's hierarchy is not a hierarchy at all and NCOs want to use their full potential in their jobs.

## POLICY CAPTURING APPLIED TO THE MASLOW NEED HIERARCHY

### I. INTRODUCTION

Abraham H. Maslow, in his theory of human motivation (Maslow 1943, 1954, 1970), hypothesized that human needs are arranged in a hierarchy. Maslow proposed that there are five need levels in the hierarchy. The need levels, from lowest to highest, are identified as: physiological, safety/security, social/affiliation, esteem/status, and self actualization.

Maslow also hypothesized that the process by which these needs affect the behavior of normal human beings has a satisfaction-importance relationship. Two things happen as a need that is important to a person becomes satisfied. First, the need begins to lose importance to the person and second, the next higher need in the hierarchy begins to gain importance. This shift of importance from one need to the next higher need will affect the behavior of a person. This person will now concentrate his efforts towards satisfying his newly found need. As his new need becomes satisfied, the process repeats itself.

Maslow does not say that a need must be fully satisfied before the next higher need level emerges. In fact, most people are partially satisfied and partially unsatisfied in all the need levels at the same time. That is, most people place some importance on all of the need levels at the same time. A more realistic view of the hierarchy is in terms of increasing and decreasing percentages. For example, a person who is on the social/affiliation need level would probably be expected to place a moderate level of importance on the adjoining levels, safety/

security and esteem/status; and a smaller level of importance on the nonadjoining need levels, physiological and self actualization.

A person's work life is a source of satisfaction, or frustration, of his Maslowian needs. Based on Maslow's theory, it is expected that an individual's evaluation of the desirability of a job would be affected by the needs he considers important and the needs satisfied by the job. The person placing a large importance on the social/affiliation need, for example, would consider a job requiring group work more desirable than a job that does not have this characteristic. It is also expected that, if a person places a large importance on a particular need, then nonadjoining needs that are satisfied by this job would have little effect on his evaluation of the desirability of the job. Another expectation is in the case of a person that places at least moderate levels of importance on two adjoining need levels. It is expected that the effect of satisfying both needs in one job would be greater than the effect of independently satisfying each need. Interactions of these needs would be expected.

A decision making exercise that used Maslow's needs as decision criteria for evaluating the desirability of a number of hypothetical jobs was completed by 234 Air Force Noncommissioned Officers (NCOs). Their decision making policy was represented by a linear model to examine the relationships described above that are suggested by Maslow's hierarchy. Some questions about the decision making behavior of the NCOs were also examined.

#### The Research Questions

The questions that are suggested by Maslow's hierarchy are as follows:

1. Will any NCO place a nil weight on any need level?

2. What need levels are most emphasized by NCOs in evaluating a job?
3. Do NCOs who place a large weight on a particular need level also place at least a moderate weight on a nonadjacent need level?
4. If moderate weights are placed on two adjacent need levels, are there interactions between these adjacent need levels?

The questions that examine the decision making behavior of the NCOs are as follows:

5. Did NCOs use interactions of the criteria in making their decisions?
6. How consistent are NCOs in their decision making?

#### Assumptions

The assumptions for this study are as follows:

1. The variable used to measure a Maslowian need level is indeed measuring that specific need level. Mitchell and Moudgill (1976) used factor analysis to identify Maslowian need levels. The variable used to measure the Maslowian need levels in this study significantly loaded on the appropriate factors in the Mitchell and Moudgill analysis. Their effort supports this assumption.
2. The subjects of the decision making exercise would have made the same decisions in real life. Brown (1972) showed that decisions made under contrived conditions, such as those used in this study, are similar to those made under natural conditions. The Brown study provides support for this assumption.

3. When less than five percent of the explainable variance was accounted for by a variable representing a particular need level, a nil relative weight was considered to have been placed on that need level by the subject. This need level was considered to have little, if any, practical effect upon the subject's decision making behavior.

4. When at least 20 percent of the explainable variance was accounted for by a variable representing a particular need level, a moderate relative weight was considered to have been placed on that need level by the subject. This need level was considered to have a substantial effect upon the subject's decision making behavior.

5. When at least 40 percent of the explainable variance was accounted for by a single variable representing a particular need level, a large relative weight was considered to have been placed on that need level by the subject. This need level was considered to have a major effect upon the subjects decision making behavior.

6. When at least 25 percent of the explainable variance was accounted for by each of two adjacent need levels (at least 50% together, an individual was considered to be operating "between" these adjacent need levels. These need levels were each considered to have a substantial effect upon the subject's decision making behavior, and taken together, they were considered to have a major effect upon the subject's decision making behavior.

#### Limitations

1. Demographics were gathered in an attempt to identify groups of subjects that put most of their emphasis on one of the need levels. Many of the demographic responses were clustered in one or two values.

The Automatic Interaction Detection (AID) algorithm (Sonquist and Morgan 1964) was used to identify groups but, since the data were clustered, the results were not successful. The results of AID will not be reported in this study. A frequency table of the demographics is in Appendix A.

2. The subjects used in this study were part of a select group, because each was attending the Senior Noncommissioned Officer Academy, Gunter Air Force Station, Alabama. They are considered to be among the best NCOs in the Air Force. To state that the implications of this study apply to all NCOs could be misleading.

#### Subsequent Chapters

Chapter II, Background will discuss policy capturing, information processing and the theory of human needs as explained by Maslow. Chapter III, Methodology, will discuss the instrument design, data accumulation and the types of analyses performed on the data. Chapter IV, Results, will present the results of the analyses performed on the data. Chapter V, Summary and Implications, will summarize the findings and present implications drawn from these findings.

## II. BACKGROUND

This chapter discusses the development of policy capturing and the theory of human motivation described by Maslow. Policy capturing is based on the Brunswik Lens Model (Brunswik, 1943). The Lens Model has been used to investigate the accuracy, consistency and uniformity of human judgment and to determine the way information is utilized in arriving at judgments. The Lens Model has also been used to evaluate the learning ability of the human mind. Statistical analysis on the data obtained with the Lens Model provides a means to determine how quickly a person can learn to use information in making his judgments and how a person utilizes information in making his judgments. It can also be used to determine the accuracy, consistency, and uniformity of individual judgments.

The theory of human motivation by Maslow will also be discussed. This discussion will center on the need hierarchy developed by Maslow and how the different levels of this hierarchy relate to one another (Maslow, 1943). The identification of an additional need level will also be presented.

### Policy Capturing

Policy capturing is conceptually based on the Brunswik Lens Model (Brunswik, 1943). The original model is shown in Figure 1. There is a group of cues  $X_i$  where  $i = 1$  to  $n$ , the state of ecology or criterion value  $Y_e$  and the response or decision of the subject,  $Y_s$ . Two regression equations can be devised by using the cues as predictor variables and  $Y_e$  and  $Y_s$  as criterion variables. These equations can be used to

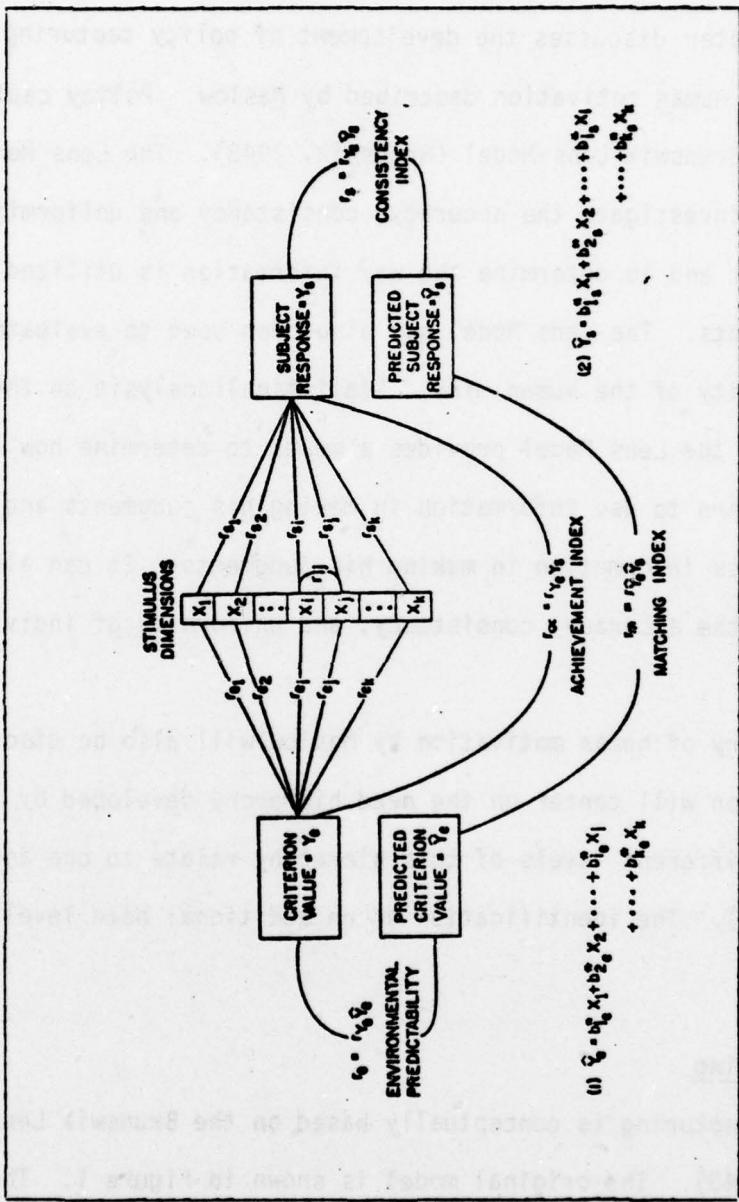


Figure 1. Brunswik Lens Model 1 (Dudycha and Naylor, 1966: 111)

calculate a predicted state of ecology  $\hat{Y}_e$ , and a predicted decision of the subject,  $\hat{Y}_s$ . Correlation techniques can then be used to evaluate the performance of the subject and predictability of the model. The environmental predictability is  $r_e$ , the correlation between  $Y_e$  and  $\hat{Y}_e$ ; the achievement index is  $r_a$ , the correlation between  $Y_e$  and  $Y_s$ ; the matching index is  $r_m$ , the correlation between  $\hat{Y}_e$  and  $\hat{Y}_s$ ; and the consistency index is  $r_s$ , the correlation between  $Y_s$  and  $\hat{Y}_s$ .

One of the uses of the Lens Model is to evaluate the judgment of clinical psychologists (Goldberg, 1968; Hoffman, 1960; Hammond, Hursch and Todd, 1964). The model provided a means to identify a degree of consistency of the judgments of one psychologist, and the degree of uniformity of the judgments from one psychologist to another. One study (Goldberg, 1968) showed that uniformity was not as high as might be desirable. There were vast differences in diagnoses from one psychologist to another.

Another use of the Lens Model is in learning development (Summers, 1962; Hursch, Hammond & Hursch, 1964). These studies were concerned with how a human being can learn to use multiple cues to estimate the state of ecology. The subjects in the experiment are shown the cues ( $X_i$ ), they respond ( $Y_s$ ), and are then shown the state of ecology ( $Y_e$ ). The Lens Model allows the researcher to determine how quickly and to what extent the subject has learned, that is, how well could the subjects estimate  $Y_e$ .

The Brunswik Lens Model can also be used to determine how a person utilizes cues in arriving at judgments. Some studies have probed the

degree that the human mind can use interactions of cues (Rorer, et al, 1967; Hoffman, et al, 1968). Interactions become significant if the patterns of cues are as important as the cues themselves. For example, the presence of cue  $X_1$  might imply  $Y_{S1}$  when cues  $X_2$ ,  $X_3$  and  $X_4$  are present, whereas the absence of  $X_1$  might imply  $Y_{S1}$  when cues  $X_2$ ,  $X_3$  and  $X_4$  are absent. For interaction effects to account for a substantial portion of the total explainable variance, such reversals would have to be the rule rather than the exception (Hoffman, et al, 1968:347).

Another use of the Lens Model is to determine if the human mind can use nonlinear cues. Some studies (Dudycha and Naylor, 1966; Goldberg, 1968; and Hammond, et al, 1964) have investigated the use of nonlinearity in models but all of these concluded that a linear model is powerful enough. The predictive power of the nonlinear model was not much more than that of the linear model. Hammond, et al, (1964) identified three conditions necessary for using a nonlinear model. Nonlinear relations should be shown (a) to exist, (b) to be detectable and (c) to be worth the trouble to detect them (Hammond, et al, 1964:446). Although Hammond and Summers (1965) have shown that the human mind can process nonlinear cues if the nonlinear functions are defined, the use of nonlinear models in cue-utilization work is not widespread.

Another use of the Brunswik Lens Model is in policy capturing. Policy capturing uses only half of the Lens Model, (see Figure 2). There is no state of ecology ( $Y_e$ ). The technique provides a means to capture the policy of a judge or a decision maker. The relative weight that a decision maker places on a cue can be determined using regression analysis (Hoffman, 1960). Nonlinear cues that are identified can be

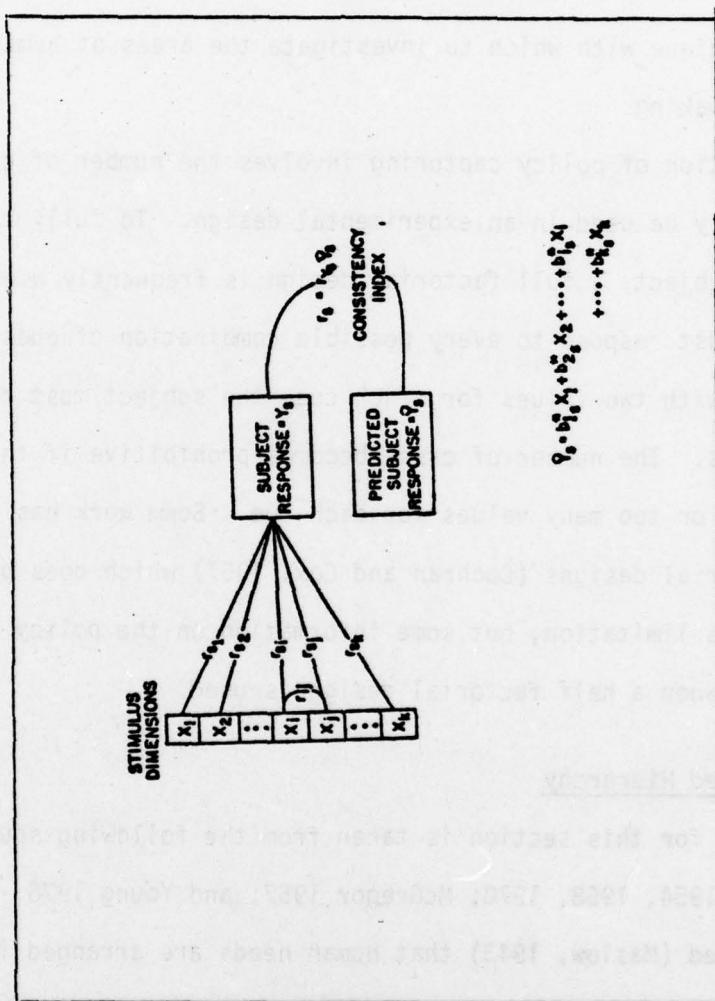


Figure 2. Policy Capturing Model

modified and used in a linear regression analysis. (Christal, 1968). Interactions of the cues that are important to the decision maker can be determined by using analysis of variance (Hoffman, et al, 1968). Policy capturing has been used in the areas of accounting (Ashton, 1974; Boatsman and Robertson, 1974), managerial decision making (Harrell, 1975), and promotion selection (Christal, 1968). Policy capturing is a widely accepted technique with which to investigate the areas of human judgment and decision making.

A limitation of policy capturing involves the number of cues that can practically be used in an experimental design. To fully capture the policy of a subject, a full factorial design is frequently used.

The subject must respond to every possible combination of cues. If there are six cues with two values for each cue, the subject must respond to  $2^6$  or 64 cases. The number of cases becomes prohibitive if there are too many cues or too many values for each cue. Some work has been done in half factorial designs (Cochran and Cox, 1957) which does provide some relief to this limitation, but some information on the policy of the subject is lost when a half factorial design is used.

#### The Maslow Need Hierarchy

Material for this section is taken from the following sources: Maslow 1943, 1954, 1968, 1970; McGregor 1957; and Young 1976. Abraham H. Maslow proposed (Maslow, 1943) that human needs are arranged in a hierarchy. As one need becomes satisfied in an individual, the next level of needs emerges. Maslow identified five levels of needs. These needs, from lowest to highest, are as follows.

Physiological needs. Physiological needs include the basic needs of existence such as air, food, water, rest, exercise, and shelter from the elements of nature. By and large, these needs are taken to be satisfied in the American society of today.

Safety/security needs. Safety/security needs include the need for protection against danger, threat, or deprivation; absence of pain or illness; existence of a predictable, organized environment with an undisruptive routine or rhythm; and avoidance of new, unfamiliar, strange or unmanageable situations. Maslow states that safety/security needs can most easily be seen in a child, since the healthy normal fortunate adult has largely satisfied these needs in this culture. One reason for the most obvious appearance of these needs in a child is that children do not inhibit their fears whereas adults do. Safety/security needs can, however, be perceived in adults in such phenomena as the common preference of familiar rather than unfamiliar things, the preference of a job with tenure, and the desire for a savings account and insurance.

Social/affiliation needs. The social/affiliation needs include the presence of friends or a mate or of children; the desire for affectionate relations with people in general, namely, for a place in a group, acceptance by associates, absence of loneliness, ostracism or rejection, and the giving and receiving of love and friendship. The functioning of this level of needs can be seen when they are thwarted, for this is a common cause of maladjustment and more severe psychopathology. The functioning of these needs can also be seen when they are met, for a tightly knit cohesive work group may be far more effective than an equal number of spearate individuals in achieving organizational goals.

Esteem/status needs. Esteem needs relate to how one sees himself -- the needs for self confidence, achievement, competence, knowledge, and adequacy; the need for a firmly based, high evaluation of oneself. Status needs relate to how one is seen by others -- the need for prestige, recognition, appreciation, dominance, importance, attention, dignity and glory; the need for deserved respect from others. The functioning of these needs can be seen in various things such as dress, coat and tie versus work shirt, name plates, titles, amount of office space, privileges, and membership in clubs. Satisfaction of these needs leads to feelings of self confidence, worth, strength, capability and adequacy of being useful and necessary in the world. Thwarting of these needs produces feelings of inferiority, weakness and helplessness.

Self-actualization. The need for self actualization includes the need for realizing the potentialities of oneself, for continued self development and for being creative in the broadest sense of the term. This need level is the most difficult of the five levels to understand. Since self actualization is the top of the hierarchy, the clear emergence of this level rests upon the prior satisfaction of the physiological, safety/security, social/affiliation, and esteem/status needs. Maslow calls these people basically satisfied people and says that these people are the exception rather than the rule. There is not much known about self actualization. The concept of this need can somewhat be seen in observing that a true musician must make music, an artist must paint or a poet must write to be ultimately happy. Self-actualization is the need for what a man can be, he must be.

### The Process

The process by which each of these five levels in the need hierarchy emerges is an important part of the theory. Normally, the satisfaction of the lower or more basic need levels is required before the emergence of the next higher need level. For example, for a person to have a strong social/affiliation need, he must first have satisfied his physiological and safety/security needs. In the words of Maslow, "A person who is lacking food, safety, love, and esteem would most probably hunger for food more strongly than anything else." (Maslow, 1943:373).

Once a need level has become satisfied, it is no longer important. As a need level, say social/affiliation, is approached from the immediately lower need level (safety/security), the safety/security need is becoming largely satisfied, and the social/affiliation need will increase in strength while the safety/security need will decrease in strength. This process continues up the hierarchy until self-actualization is reached.

At the self-actualization level there is a reversal in the satisfaction importance relationship. The satisfaction of the self actualization need will produce a stronger need for self actualization. "When we examine people who are predominately growth motivated...gratification breeds increased rather than decreased motivation." (Maslow, 1963:30).

The preceding discussions on the prepotency of the needs might give the impression that a need must be fully satisfied before the next need emerges. This is not true. In fact, most people are partially satisfied in all their needs and partially unsatisfied in all their needs at the same time. A more realistic view of the hierarchy is in

terms of increasing and decreasing percentages. For example, if safety/security needs are 10 percent satisfied, then social/affiliation needs may not be visible at all. As safety/security needs become 75 percent satisfied, then social/affiliation needs may emerge 25 percent and so on.

### Autonomy

In his desire to learn more about self-actualizing people, Maslow performed a study where he sought only to teach and to convince himself rather than to prove or to demonstrate to others. In this study he addressed autonomy as a characteristic of a self-actualizing person. Maslow presented two meanings for autonomy. The first meaning was that it is the "quality detachment" and "a need for privacy." Almost all self-actualizing people "positively like solitude and privacy to a definitely greater degree than the average person" (Maslow 1970:160). Maslow further says that self-actualizing people remain unruffled and undisturbed by that which produces turmoil in others. They find it easy to be aloof, reserved, and also calm and serene. They seem to be able to retain their dignity even in undignified surroundings and situations. "Perhaps this comes in part from their tendency to stick by their own interpretations of a situation rather than rely upon what others feel or think about the matter" (Maslow, 1970:160).

Maslow presents another meaning of autonomy. Autonomy is self decision; self government; being an active, responsible, deciding agency rather than a pawn; or being strong rather than weak. Self-actualizing people make up their own minds, come to their own decisions, are self-starters, are responsible for themselves and for their own destinies. Too many people have their minds made up for them by salesmen,

advertisers, parents, teachers, television, newspapers and so on. They are pawns being moved by others rather than self moving self determining individuals. They are apt to feel helpless, weak and totally determined, rather than self determining, responsible people (Maslow, 1970:161).

Maslow further describes autonomy as the relative independence of the physical and social environment that self actualizing people have. Since they are propelled by growth motivation rather than deficiency motivation, self actualizing people are not dependent for their main satisfactions on the real world or other people; or in general, on extrinsic satisfaction. Rather they are dependent on their own potentialities and latent resources. Deficiency motivated people must have other people available since most of their need gratification can only come from other human beings. Growth-motivated people may actually be hampered by others. The determinants of satisfaction for them are inner-independent and not social. The honors, the status, the popularity, the prestige and the love they can acquire and bestow have become less important to them than self-development and inner-growth.

"It's the strong, healthy, autonomous person who is most capable of withstanding loss of love and popularity, but this strength and health have been ordinarily produced in our society by early chronic gratification of safety, love, belongingness, and esteem needs" (Maslow 1970:58).

Maslow has identified autonomy as a characteristic of self actualizing people and that this characteristic was developed by the satisfaction of safety, affiliation and esteem needs. Since this characteristic, autonomy, is developed from the satisfaction of prepotent needs, prior to a person becoming self actualized, it is conceivable that autonomy is an additional need level between esteem and self actualization. Autonomy

could be a need to be satisfied, that is, people drive to become autonomous before they can become self-actualizing. Of the self actualizing subjects that Maslow investigated, 100 percent of them were autonomous (Maslow 1970:163).

Porter (1961a, 1961b, 1962, and 1963) was the first author to break autonomy into a separate need level. Porter developed a questionnaire that would determine a need deficiency and a need importance in a person. He felt that the items that he used to elicit the deficiency and importance of autonomy would fall in the esteem category of needs in Maslow's system. Porter argues that "...these items have been put into a separate category since it seemed that they are logically distinct from other items that are more commonly associated with the term 'esteem'. Therefore, the autonomy items have been inserted in the hierachial order of needs between the esteem category and the self actualization category, to which they have some relation.." (Porter 1961b:3) Other authors (Payne, 1970; Waters and Roach, 1973; Mitchell and Moudgill, 1976) have also used the additional need level, autonomy, in their studies. Since autonomy has previously been used as a separate need level, and Maslow does not argue against its existence, then the writer felt that autonomy could be used as a need level in this study. It is inserted in the same place in the hierarchy as indicated by Porter (1961b, 1962, 1963), between esteem and self-actualization.

### Summary

This chapter has presented the development, capabilities, and uses of the Brunswik Lens Model. The emergence of Policy Capturing from the Lens Model was presented and the capabilities and some limitations of policy capturing were discussed.

A synopsis of the hierarchy of needs by Maslow and the process that governs the interrelationships of these needs was presented. The identification of an additional need level in the hierarchy was discussed.

### III. METHODOLOGY

This chapter presents a description of the instrument design and the method of data accumulation. This is followed by a discussion on the analysis techniques that were used and the interpretation of the output of these analyses. Also presented is an approach to tie the results of the analyses to Maslow's theory.

#### Instrument Design and Data Collection

The instrument used to gather data is based on policy capturing and involves a decision making exercise. See Appendix B for a replication of the exercise. There were five cues, or decision criteria that were used for each decision. The five decision criteria were the five modified Maslow needs that were used by Porter (1961a, 1961b, 1962, and 1963). These needs were security, affiliation, esteem, autonomy, and self-growth.

Porter used 13 items to elicit the needs of a respondent. Due to the limitations of policy capturing, only one item for each need level was used. Mitchell and Moudgill (1976) factor analyzed 24 management position characteristics, including the 13 original Porter items to determine if the five modified Maslow need levels could be identified. The study was successful in identifying the Maslow need levels. The decision criteria used for the decision making exercise were chosen from the characteristics that loaded on the expected Maslow need levels.

The decision making exercise consisted of evaluating the desirability of 32 hypothetical jobs. For each hypothetical job, each of the five need levels was described as either being satisfied or not satisfied. Since there were only two values for each of the criteria and five criteria,

32 jobs provided a full factorial design ( $2^5 = 32$ ). Each subject was asked to judge the desirability of each hypothetical job. Desirability was measured on a seven point scale. The subjects were asked to consider only the factors presented in the exercise when they made their decisions. Any other factors affecting the desirability of a job were assumed to be the same for each job. The order of the criteria in the jobs and the order of jobs in the exercise were randomized.

The purpose for choosing desirability of a job as a decision variable was straightforward. It was felt that all subjects had made a similar decision in the process of choosing some previous assignment. Different criteria may have been used in these previous decisions, but each individual had some experience at making this kind of decision.

The data was accumulated at the Senior Noncommissioned Officer Academy, Gunter Air Force Station, Alabama. This Academy is part of the Professional Military Education (PME) for Air Force Noncommissioned Officers. The school gave its full cooperation to run the study.

Arrangements had been made for the writer to meet with all of the students at the school in an auditorium for 45 minutes. The group did not know anything about the exercise until briefed by the writer, at which time they were asked to participate in a decision mkaing exercise. The group was told by the writer that the data from the exercise would be reported in a thesis for a Master of Science degree and that analyses of thier decision making would be a part of the thesis. The group was further told that their participation in the exercise was voluntary and that they would receive feedback about their deicison making from the writer if they desired. Names on the exercise were not required, unless

feedback was requested. An opportunity to leave the room was provided before the exercise was distributed. The group was asked to complete the exercise in their seats and deposit the completed exercises in boxes at the exists as they left the room. Everyone finished in the allotted time.

There was no mention of Maslow's theory or a need hierarchy by this researcher in the briefing to the subjects. The normal course of training at the school had, however, covered Maslow's theory about two weeks before the NCOs participated in the exercise.

Of the 239 subjects selected, 234 (98%) completed and returned the decision making exercise. Due to printing errors and skipped decisions, 38 returned exercises had at least one decision missing. Sixty-eight of the subjects requested feedback about how they performed in comparison with their contemporaries.

#### Data Analysis

The analysis techniques that were used on the data were regression analysis and analysis of variance (ANOVA). A FORTRAN program and the Statistical Package for the Social Sciences (SPSS) (Nie, et al, 1970) were used on a CDC 6600 CYBRE 70 series computer for all the analysis.

The FORTRAN program performed regression analysis on each individual subject's decisions. See Appendix C for a listing of the program. This regression provided the capability to calculate the relative weight that each individual NCO placed on each decision criterion (Hoffman, 1960). The sum of the relative weights for an individual is equal to one. The relative weight of a decision criterion can be interpreted as the amount of importance that the particular subject places on that criterion.

In addition to the relative weights on each factor, individual regression analysis provides the degree of consistency with which the respondent has made decisions. The  $R^2$  for the regression identifies the amount of predictable variance in the decisions. This  $R^2$  can be thought of as the consistency of the decisions of an NCO.

The other analysis technique, ANOVA, was used to determine if there are interactions of the factors (Hoffman, et al, 1968). An ANOVA of the data can determine how the respondents used the information to make their decision. ANOVA will determine if the respondents perceived the factors as independent or not. This provides some insight to the decision making process of an NCO.

The ANOVA approach allowed the researcher to compare any interactions with what Maslow's theory would predict. Interactions of adjoining levels of the need hierarchy are explainable by Maslow's theory but interactions of nonadjoining levels, for example self growth and security, are not explainable.

Due to the orthogonal design of the decision making exercise, an analysis of variance can only be done on cases where all decisions were made. Because of this, the analysis of variances was performed on only 196 cases, instead of the 234 that were returned.

#### IV. RESULTS

This chapter answers the questions that were presented in Chapter I. The first section addresses questions that are suggested by Maslow's hierarchy. The second section addresses the questions on the decision making behavior of NCOs.

##### Questions on Maslow's Hierarchy

The first question to be addressed is: (1) Will any NCO place a nil weight on any need level? Table I presents the number of subjects that had at least one need level with a relative weight less than .03, .04, and .05, by need level. In examining the less than .03 column on Table I, it can be seen that self growth and autonomy had the least number of relative weights below .03 with 13 each. The esteem and security need levels each had 32 relative weights below .03 and the affiliation need level had the highest number of relative weights below .03 with 58. Reading across the row of Table I, it can be seen that the pattern of self growth and autonomy having the smallest number of low relative weights, then esteem and security next, than affiliation with the most number of low relative weights, continues for each specific relative weight of .03, .04, and .05.

The totals of Table I present the number of times at least one relative weight was less than the specified relative weight. This is not the sum of the columns of Table I since one subject could have weighted more than one need level less than the specific weight. The totals do show that 109 subjects or 47 percent of the population weighted

TABLE I

## Low Relative Weights (RW)

Need Level	Occurrences RW < .03	Occurrences RW < .04	Occurrences RW < .05
Self Growth (SG)	13 ( 5%)	17 ( 7%)	22 ( 9%)
Autonomy (AU)	13 ( 5%)	17 ( 7%)	20 ( 8%)
Esteem (ES)	32 (14%)	45 (19%)	56 (24%)
Affiliation (AF)	58 (25%)	78 (33%)	83 (35%)
Security (SC)	<u>32 (14%)</u>	<u>39 (17%)</u>	<u>51 (22%)</u>
TOTAL*	109 (47%)	140 (60%)	153 (65%)

\*Totals are not the sums of the columns because some subjects weighted more than one need level less than the specified weight.

at least one need level less than .03 and that 153 subjects, or 65 percent of the population, weighted at least one need level less than .05.

It has been previously assumed that a relative weight less than .05 is nil and has little, if any, effect on one's decision making behavior. Since 65 percent of the population weighted a need level nil, it seems that the behavior of most NCOs is not affected by all need levels. The answer to question (1) is yes, 65 percent of the population weighted at least one need level nil.

The second question to be addressed is: What need levels are most emphasized by NCOs in evaluating a job? Table II presents the mean relative weight and largest relative weight for each need level along with the number of times each need level had a relative weight greater than .4 and .5. Table II shows that this group of NCOs placed the most importance on self growth and autonomy. Self growth had a relative weight greater than .5 in 46 cases and greater than .4 in 66 cases. Autonomy had a

TABLE II  
High Relative Weights (RW)

Need Level	Mean RW	High RW	Occurrences RW > .5	Occurrences RW > .4
Self Growth (SG)	.291	1.0	46 (20%)	66 (28%)
Autonomy (AU)	.266	.899	36 (15%)	59 (25%)
Esteem (ES)	.161	.722	9 (4%)	16 (7%)
Affiliation (AF)	.117	.720	5 (2%)	10 (4%)
Security (SC)	.165	.692	8 (3%)	14 (6%)
TOTALS			102* (44%)	157* (67%)
*some subjects weighted two levels >.4 or >.5.				

relative weight greater than .5 in 36 cases and greater than .4 in 59 cases. Over 50 percent of the NCOs weighted either self growth or autonomy greater than .4.

Tables III through VII present rank orderings of the need levels. The need levels are identified in Table I. The numbers in these tables are the number of times the need level was ranked in a particular position, conditional upon the ordering of the need levels above it. For example, in Table III the upper left hand block has self growth (SG) ranked first 99 times, autonomy (AU) ranked second 41 times when self growth was ranked first. and esteem (ES) is ranked third 14 times when self growth is first and autonomy is second. These tables show that self growth was ranked first by 99 NCOs or 42 percent, and autonomy was ranked first by 72 NCOs or 31 percent of the group. Esteem had the next highest

TABLE III  
Occurrences of Conditional Rankings (SG ranked 1)  
N = 234

Ranking	Need Level	Occurrences	Need Level	Occurrences	Need Level	Occurrences
1	SG	99	SG	99	SG	99
2	AU	41	AU	41	AU	41
3	ES	14	AF	17	SC	21
<hr/>						
1	SG	99	SG	99	SG	99
2	ES	22	ES	22	ES	22
3	AU	9	AF	10	SC	9
<hr/>						
1	SG	99	SG	99	SG	99
2	AF	21	AF	21	AF	21
3	AU	10	ES	4	SC	1
<hr/>						
1	SG	99	SG	99	SG	99
2	SC	31	SC	31	SC	31
3	AU	18	ES	14	AF	9
<b>SG = self growth, AU = autonomy, ES = esteem, AF = affiliation, SC = security.</b>						

TABLE IV  
Occurrences of Conditional Rankings (AU ranked 1)

Ranking	Need Level	Occurrences	Need Level	Occurrences	Need Level	Occurrences
1	AU	72	AU	72	AU	72
2	SG	31	SG	31	SG	31
3	ES	16	AF	7	SC	14
<hr/>						
1	AU	72	AU	72	AU	72
2	ES	20	ES	20	ES	20
3	SG	9	AF	7	SC	8
<hr/>						
1	AU	72	AU	72	AU	72
2	AF	14	AF	14	AF	14
3	SG	10	ES	4	SC	4
<hr/>						
1	AU	72	AU	72	AU	72
2	SC	24	SC	24	SC	24
3	SG	11	ES	11	AF	6
SG = self growth, AU = autonomy, ES = esteem, AF = affiliation, SC = security						

TABLE V  
Occurrences of Conditional Rankings (ES ranked 1)

Ranking	Need Level	Occurrences	Need Level	Occurrences	Need Level	Occurrences
1	ES	37	ES	37	ES	37
2	SG	15	SG	15	SG	15
3	AU	8	AF	4	SC	8
<hr/>						
1	ES	37	ES	37	ES	37
2	AU	15	AU	15	AU	15
3	SG	5	AF	6	SC	5
<hr/>						
1	ES	37	ES	37	ES	37
2	AF	10	AF	10	AF	10
3	SG	5	AU	4	SC	3
<hr/>						
1	ES	37	ES	37	ES	37
2	SC	12	SC	12	SC	12
3	SG	9	AU	5	AF	2
SG = self growth, AU = autonomy, ES = esteem, AF = affiliation, SC = security						

TABLE VI  
Occurrences of Conditional Rankings (AF ranked 1)

Ranking	Need Level	Occurrences	Need Level	Occurrences	Need Level	Occurrences
1	AF	18	AF	18	AF	18
2	SG	7	SG	7	SG	7
3	AU	5	ES	4	SC	3
<hr/>						
1	AF	18	AF	18	AF	18
2	AU	6	AU	6	AU	6
3	SG	4	ES	1	SC	4
<hr/>						
1	AF	18	AF	18	AF	18
2	ES	8	ES	8	ES	8
3	SG	5	AU	3	SC	2
<hr/>						
1	AF	18	AF	18	AF	18
2	SC	3	SC	3	SC	3
3	SG	2	AU	3	ES	1
SG = self growth, AU = autonomy, ES = esteem, AF = affiliation, SC = security						

TABLE VII  
Occurrences of Conditional Rankings (SC ranked 1)

Ranking	Need Level	Occurrences	Need Level	Occurrences	Need Level	Occurrences
1	SC	30	SC	30	SC	30
2	SG	10	SG	10	SG	10
3	AU	4	ES	6	AF	2
<hr/>						
1	SC	30	SC	30	SC	30
2	AU	10	AU	10	AU	10
3	SG	5	ES	4	AF	1
<hr/>						
1	SC	30	SC	30	SC	30
2	ES	11	ES	11	ES	11
3	SG	4	AU	6	AF	3
<hr/>						
1	SC	30	SC	30	SC	30
2	AF	4	AF	4	AF	4
3	SG	0	AU	2	ES	2
SG = self growth, AU = autonomy, ES = esteem, AF = affiliation, SC = security						

number of first rankings with 37 or 16 percent, then security with 30 or 13 percent, and finally affiliation with 18 or eight percent of the group. These percentages do not add to 100 percent because a "greater than or equal to" criteria was used for the rankings and the equal weights are doubled counted.

Tables II through VII definitely show that self growth and autonomy are the most important need levels to most NCOs when selecting a job. Self growth or autonomy was ranked first in 168 cases or in 72 percent of the group. Each of these two need levels were weighted greater than .4 or .5 by more NCOs than the other three need levels combined. Self growth and autonomy are definitely perceived as the most important to this group of NCOs as a whole.

The esteem and security need levels are perceived as the second most important needs. Tables III through VII show that 67 or 28 percent of the NCOs in the group ranked esteem or security first. Table II shows that these need levels were weighted greater than .4 and .5 more times than affiliation. The perceived importance of esteem and security was about equal for the group and slightly less important than self growth or autonomy.

Affiliation is the need level that is perceived to be the least important to NCOs in a job. This need level was ranked first fewer times than any other need level and was weighted greater than .4 and .5 fewer times than any other need level. A possible explanation for affiliation having very little importance in a job is that satisfaction of this need is found away from the job. Affiliation needs were ranked very low by lower level managers in a recent survey in a civilian corporation (Weger,

1971). The Weger study also found these same managers were very active in social activities that were not related to work, such as Boy Scouts hunting and fishing, clubs, and other community activities. The affiliation needs of these lower level managers were being satisfied in places other than on their jobs. Since NCOs are comparable to lower level civilian managers, possibly an NCO's affiliation needs are met away from his job, as seems to be the case with his civilian counterpart. If this is true, then it could be an explanation for why affiliation is perceived to be unimportant in a job.

The next question to be addressed is: (3) Do NCOs who place a large relative weight on a particular need level also place a moderate relative weight on a nonadjacent need level? Table VIII presents the number of NCOs that weighted one need level greater than .4 and a nonadjacent need level greater than .2. The table is read like a matrix. For example, self growth (SG) was weighted greater than .4 and affiliation (AF) was weighted greater than .2 by six NCOs.

The total number of times that a nonadjacent need had a moderate relative weight was 67. Six of these instances involved double counting because some NCOs weighted two nonadjacent needs greater than .2. For example, one NCO weighted esteem greater than .4 and weighted both self growth and security greater than .2. Eliminating the double counts bring the number of NCOs, who weighted nonadjacent needs moderately, down to 61 or 26 percent of the population. Table II shows that only 157 NCOs weighted at least one of the need levels greater than .4. Of the NCOs who did weight a need greater than .4, 39 percent weighted a nonadjacent need greater than .2.

TABLE VIII  
Occurrences of Moderate Relative Weights on a Nonadjacent Need Level  
N = 157

	SG>.4	AU>.4	ES>.4	AF>.4	SC>.4	Totals
SG > .2	-	-	4	1	2	7
AU > .2	-	-	-	4	5	9
ES > .2	9	-	-	-	4	13
AF > .2	6	7	-	-	-	13
SC > .2	10	11	4	-	-	25
TOTALS	25	18	8	5	11	61*

\*Six subjects weighted more than one nonadjacent level greater than .2.

Maslow's theory does not predict that nonadjacent needs will be weighted in the manner described above. The theory indicates that if an individual is at a particular level in the hierarchy, then the nonadjacent need levels will be relatively unimportant. This study assumes that a large relative weight will place an individual on that particular need level and that a moderate relative weight has a substantial effect on the decision making behavior of that individual. Thirty-nine percent of the NCOs who were at a particular need level placed a moderate relative weight on a nonadjacent need level. This evidence is not consistent with Maslow's hierarchy. Need levels that are nonadjacent to the need level that a person is operating at were predicted to have little, if any, effect on the decision making behavior of this person.

The fourth question to be addressed is: (4) If moderate weights are placed on two adjacent need levels, are there any interactions between

these adjacent needs? To answer this question, four analyses of variance were run, one on each of the following subgroups: Self growth greater than .25 and autonomy greater than .25 (SG-AU); autonomy greater than .25 and esteem greater than .25 (AU-ES); esteem greater than .25 and affiliation greater than .25 (ES-AF); and affiliation greater than .25 and security greater than .25 (AF-SC). The affiliation and security subgroup (AF-SC) had only one case where both need levels were greater than .25, therefore, a four way analysis of variance was run instead of a five way analysis of variance. All cases included in a subgroup had the need levels identifying a subgroup weighted at least as high as any other need level. For example all cases included in the (AU-ES) subgroup had both autonomy and esteem weighted greater than self growth, affiliation, and security.

Table IX presents the results of the analysis. As can be seen, there was only one significant interaction found at the .001 level and four at the .05 level. None of these statistically significant interactions account for very much of the explainable variance. The self growth - autonomy group had three significant interactions at the .05 level. In total, these terms only accounted for 1.6 percent of the explainable variance. This indicates that adjacent need levels have no substantial interactions. If a person is not on a particular need level, but he is "between" two levels, then we would expect that satisfaction of both of these need levels together would be more important than the satisfaction of both of the need levels independently. The results did not show this to be true.

TABLE IX  
Analysis of Variance for Interlevel Interactions

Group	Number of Subjects	Number of Significant Interactions		% of Explainable Variance Accounted for by significant Interactions	
		p < .05	p < .001	p < .05	p < .001
SG-AU	29	3	1	1.6%	.8%
AU-ES	9	1	0	.9%	0%
ES-AF	2	0	0	0%	0%
AF-SC	1	0	0	0%	0%

#### NCO Decision Making Behavior

The second area that this study addresses includes the decision making behavior of an NCO. The first question in this area is (5): Did the NCOs use interactions of the data provided to them in making their decisions? An analysis of variance on all of the usable data revealed that there were statistically significant interactions between the need levels but that the contribution of the interactions to the predictability of a decision was negligible. Statistical significance of an interaction is dependent upon the number of degrees of freedom which is directly proportional to the number of cases in the analysis. The main effects were all statistically significant and explained 49 percent of the total variance. All of the interactions accounted for only 1.5 percent of the total variance. This indicates that the NCOs who participated in the exercise did not use substantial interactions of the data in reaching their decisions.

The data was then broken down into five subgroups, where each group was made up of individuals having a particular need level that was weighted the largest. For example, all individuals who weighted self growth greater than or equal to any other need level were placed in one subgroup. An analysis of variance was run on each of these subgroups and the number of statistically significant interactions for each subgroup was less than the overall group. Again the main effects for each subgroup were statistically significant and accounted for almost all of the explainable variance.

Table X presents the results of these analyses of variance. Listed are the number of statistically significant interactions (26 is the maximum possible for an analysis), and the percentage of the explainable variance accounted for by the significant interactions. Generally, as the number of cases in an analysis was decreased, the number of statistically significant interactions was also reduced. This is reasonable since the number of significant interactions is dependent upon the number of degrees of freedom which in turn is dependent upon the number of cases.

The fact that the interactions contributed very little to the explainable variance implies that the NCOs did not look for patterns of the cues. Instead, they evaluated the effect of each cue independently of the effects of other cues in the same hypothetical job description. The subjects made their decisions in a linear fashion.

The second question to be addressed in this area is (6): How consistent are NCOs in their decision making? The  $R^2$  associated with each individual regression can be interpreted as the degree of consistency with which an individual has made his decisions. Since the interactions

TABLE X  
Analysis of Variance for Linear Use of Information

Group	Number of Cases	Number of Significant Interactions		% of Explainable Variance Accounted for by Significant Interactions	
		p < .05	p < .001	p < .05	p < .001
Total	196	14	5	2.7%	1.7%
SG ranked 1	86	9	2	2.0%	.7%
AU ranked 1	54	8	3	2.8%	1.8%
ES ranked 1	22	0	0	0%	0%
AF ranked 1	14	2	0	5.0%	0%
SC ranked 1	28	4	1	2.8%	1.3%

of the need level were found to have very little predictive power, the  $R^2$  for the linear regression will be used as the indicator of consistency. Statistically,  $R^2$  is the fraction of the variance in the decisions that can be explained by the regression equation. Therefore,  $R^2$  can be interpreted as the fraction of times a decision maker is consistent.

Table XI presents some statistics for  $R^2$ . The mean is .689 and the median is .756. Sixty-two percent of the NCOs had an  $R^2$  greater than the mean  $R^2$ .

Cases where  $R^2$  was extremely low ( $R^2 < .29$ ) seemed to be due to random responses by the participant, although there was no proof that this was the case. the number of suspected cases of random answering was small (7 cases or 3% of the respondents), therefore the effect that these cases would have is small. Since there was no criterion for eliminating data and the amount of questionable data was relatively small, no cases were removed.

TABLE XI

Statistics for  $R^2$ 

Mean	= .689	Standard Error = .011
Variance	= .030	Kurtosis = 1.816
Minimum	= .047	Maximum = 1.000
Standard Deviation = .172		Median = .756

Figure 3 is a histogram of the number of NCO's in a particular  $R^2$  range. From this figure it can be seen that 175 NCOs or 75 percent have an  $R^2$  in the range of .6 to .9. Only 14 percent of the NCOs have an  $R^2$  less than .5. These numbers imply that most NCO's are quite consistent to their individual decision making strategies.

Summary

This chapter considered the questions that were posed in Chapter I. The relative importance of each need level was discussed, the questions of the process of Maslow's need hierarchy were addressed, and the decision making behavior of NCOs was examined.

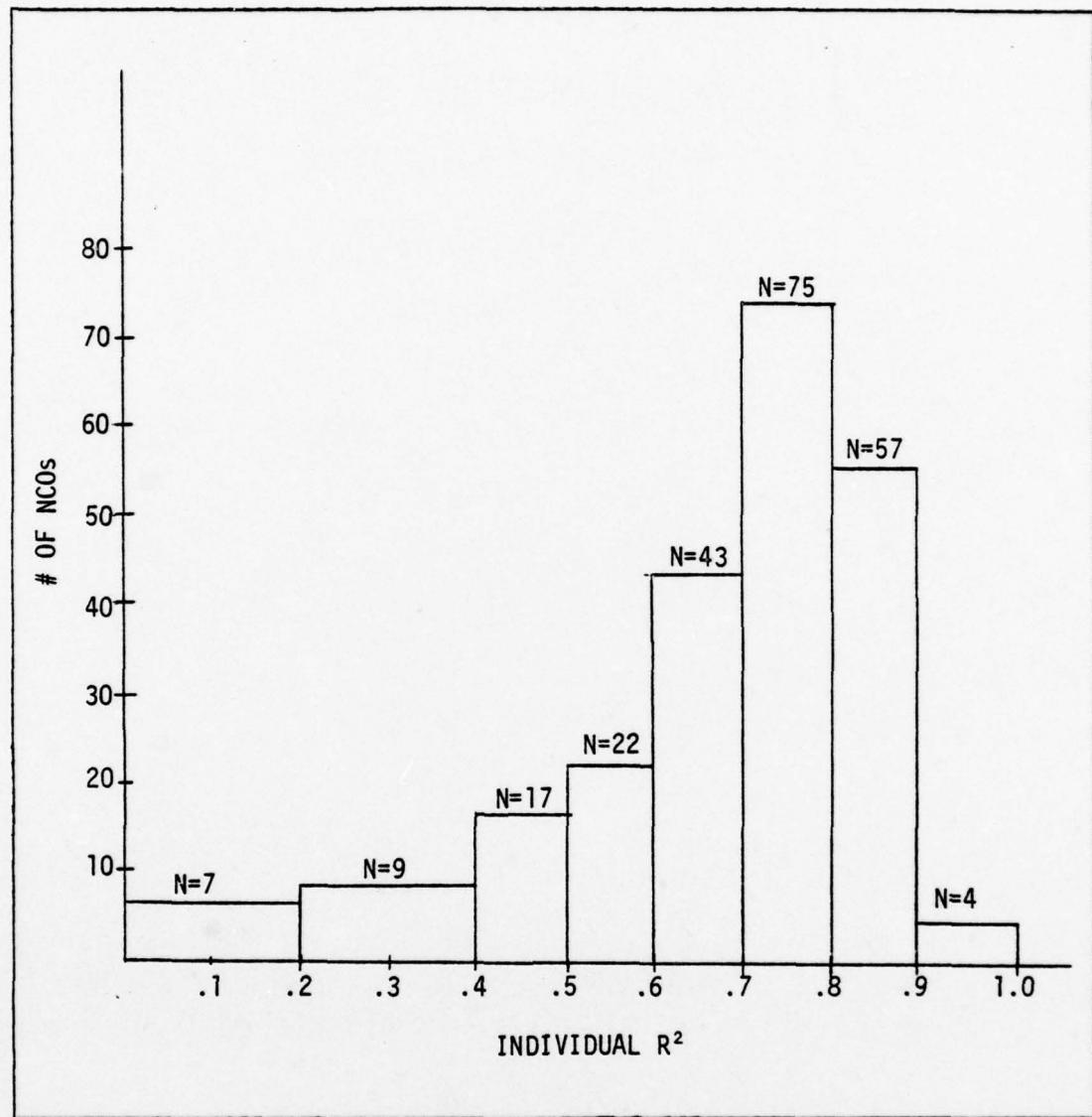


Figure 3. Histogram of Individual  $R^2$

## V. SUMMARY AND IMPLICATIONS

This chapter summarizes the entire research effort and presents implications drawn from the results of the analysis.

### Summary

The purpose of this study was to address some questions suggested by Maslow's hierarchy and to provide some insight into the decision making behavior of NCOs. To accomplish this, 234 NCOs at the Senior Noncommissioned Officer Academy voluntarily participated in a decision making exercise. The data obtained from these exercises was analyzed using regression analysis and analysis of variance.

The decision making exercise was a policy capturing instrument composed of 32 hypothetical jobs. The jobs were described using a modified set of Maslow's hierarchy of needs. The modified set of needs were: security, affiliation, esteem, autonomy, and self growth. Each need criterion was stated to be either present or not present in each job description. The decision making exercise was a full factorial design.

Relative weights on each need were calculated for each subject from the regression analyses. The relative weights can be interpreted as the amount of importance that a person places upon a particular need. The sum of the five relative weights for an individual is equal to one. Analysis of variance was the other statistical technique used to analyze the data. This analysis enabled the researcher to determine if there were any interactions of the criteria or need levels.

Maslow's hierarchy of human needs is governed by a satisfaction-importance relationship. The theory predicts that as a need becomes

satisfied, the importance of this need to an individual recedes and the importance of the next higher need level emerges. Most people are considered to operate primarily at a particular need level and their behavior is considered to be largely influenced by this need. Although one need level may be predominant in an individual, all the needs are expected to affect the behavior of a person.

It is expected that Maslow's hierarchy of human needs would have an effect on an individual's evaluation of the desirability of a job. All need levels are expected to have some effect on the evaluation of the desirability of a job. A person that is at a particular need level should evaluate the desirability of a job higher if that need can be satisfied in the job than if that need cannot be satisfied in the job. It is also expected that if a person is operating at a particular need level, nonadjacent need levels would have little influence on that person's evaluation of the desirability of a job. Another expectation is that if at least moderate relative weights are placed on adjacent need levels then, there should be interactions between these levels.

The first finding of this study was that most NCOs did place a nil relative weight (less than .05) on at least one need level. That is, most subjects had one need level that had little, if any, influence upon their evaluation of the desirability of a job. The second finding of the study was that self growth and autonomy were perceived as the most important needs in a job. Esteem and security were the second most important needs and affiliation was found to be the least important in a job. The third finding of the study was that, of the NCOs that were at a particular need level, 39 percent were substantially influence in their evaluation of the

desirability of a job by a nonadjacent need. The influence of the nonadjacent need was greater than the influence of the adjoining need. The fourth finding of the study was that there were no substantial interactions between adjoining need levels upon which at least moderate relative weights were placed. When moderate relative weights were associated with adjoining need levels, the desire to satisfy one of these needs was apparently independent of whether or not the other need was satisfied. The fifth and sixth findings of the study were about the decision making behavior of NCOs. The NCOs were found to make their decisions linearly. There were some statistically significant interactions between the criteria but the contribution of these interactions to the explainable variance was not substantial. The final finding was that NCOs were consistent in 69 percent of their decisions.

#### Implications of the Findings

The first finding is that most subjects had a nil relative weight on at least one need level. This result implies at least one of Maslow's needs had little or no influence on the subject's evaluation of the desirability of a job. This is contrary to the behavior predicted by the Theory.

The second finding involved the overall order of importance placed on the needs. Self growth was ranked first, autonomy second, then equally esteem and security, and affiliation last. There are two implications from this result. First, the fact that self growth and autonomy are the most important needs implies that this group of NCOs are lacking the opportunity to satisfy their autonomy and self growth needs in their jobs.

Jobs available to these NCOs are often very structured and sometimes offer little opportunity for creativity. The findings suggest that NCOs want to be able to use their full potential in their work.

Another implication of the second finding is that esteem and security are of secondary importance to these NCOs. The limited importance of esteem is not too surprising. Most of the participants in the exercise were Senior Master Sergeants and this military rank has status within the military. It seems reasonable that the esteem needs have been somewhat satisfied but are not fully satisfied. The structured work of most NCOs probably, but not entirely, satisfies their security needs.

The third finding was that 39 percent of the subjects operating at a particular need level placed at least a moderate relative weight upon a nonadjacent need level. The relative weight placed upon this nonadjacent need substantially exceeded that placed upon an intervening adjacent need in these instances. This implies that Maslow's hierarchy does not function as Maslow hypothesized. The theory predicts that a nonadjacent need level would be expected to have a substantially smaller relative weight than an adjacent need. This finding suggests that Maslow's hierarchy is not a hierarchy at all.

The fourth finding was that there were no substantial interactions between adjacent need levels upon which at least moderate relative weights were placed. This implies that the needs of Maslow's hierarchy are relatively independent from one another. The desire to satisfy a particular need appears to be separate from the satisfaction of other needs. Again this outcome is not what is predicted by Maslow's theory.

The fifth and sixth findings involved the decision making behavior of NCOs. The NCOs were found to make decisions largely in a linear fashion. The implication of this finding is that NCOs used the information linearly to make their decisions. The subjects did not perceive patterns. Instead they evaluated the effect of each criterion independently. This finding was expected because most of the literature reviewed by the researcher indicated that most decisions were arrived at by using the information linearly.

The sixth finding was that NCOs are consistent in their decision making. Consistent decisions imply that a person is predictable. Predictability is very important for a manager because both his subordinates and his superiors find it easier to interact with him if he is predictable. The ability to interact with people is an asset to a manager, and the consistency of NCO decisions implies that they have this asset.

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**APPENDIX A**

**Frequencies of Demographic Data**

10/28/77

FILE - NONAME - CREATED 10/28/77

## 02 COMMAND ASSIGNED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
US AIR FORCE ACAD	2.	1	.4	.4	.4
AERO DEF CMD	3.	10	4.3	4.3	4.7
USAFE	4.	25	10.7	10.7	15.4
AF ACCTS AND FIN	5.	1	.4	.4	15.8
AFLC	6.	2	.9	.9	16.7
AFSC	7.	12	5.1	5.1	21.6
ATC	9.	22	9.4	9.4	31.2
AU	10.	3	1.3	1.3	32.5
HQ AIR FORCE RESERVE	12.	3	1.3	1.3	33.8
AF DATA AUTO AGENCY	14.	4	1.7	1.7	35.5
HQ CMD	15.	3	1.3	1.3	36.8
MAC	16.	37	15.8	15.8	52.6
PAC AF	17.	6	2.6	2.6	55.1
SAC	18.	43	18.4	18.4	73.5
TAC	19.	30	12.8	12.8	86.3
AF MPC	21.	2	.9	.9	87.2
AF OSI	24.	2	.9	.9	88.0
OTHER	25.	28	12.0	12.0	100.0
	TOTAL	234	100.0	100.0	

VALID CASES

234

MISSING CASES

0

10/28/77

FILE - NONAME - CREATED 10/28/77

## Q3 TIME IN MILITARY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
12 YEARS	4.	1	.4	.4	.4
14 YEARS	6.	6	2.6	2.6	3.0
15 YEARS	7.	3	1.3	1.3	4.3
16 YEARS	8.	18	7.7	7.7	12.0
17 YEARS	9.	13	5.6	5.6	17.5
18 YEARS	10.	32	13.7	13.7	31.2
19 YEARS	11.	24	10.3	10.3	41.5
20 YEARS	12.	23	9.8	9.8	51.3
21 YEARS	13.	28	12.0	12.0	63.2
22 YEARS	14.	47	20.1	20.1	83.3
23 YEARS	15.	26	12.0	12.0	95.3
24 YEARS	16.	6	2.6	2.6	97.9
25 YEARS	17.	1	.4	.4	98.3
26 YEARS	18.	1	.4	.4	98.7
28 YEARS	20.	2	.9	.9	99.6
29 YEARS OR MORE	21.	1	.4	.4	100.0
	TOTAL	234	100.0	100.0	

VALID CASES 234 MISSING CASES 0

10/28/77 FILE - NONAME - CREATED 10/28/77

04 GRADE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
E-9	1.	12	5.1	5.1	5.1
E-8	2.	207	88.5	88.5	93.6
E-7	3.	15	6.4	6.4	100.0
TOTAL		234	100.0	100.0	
VALID CASES		234	MISSING CASES	0	

10/28/77

FILE - NONAME - CREATED 10/28/77

## 05 TIME IN GRADE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
LESS THAN 1 YEAR	1.	90	38.5	38.6	38.6
1 YEAR	2.	73	31.2	31.3	70.0
2 YEARS	3.	31	13.2	13.3	83.3
3 YEARS	4.	28	12.0	12.0	95.3
4 YEARS	5.	4	1.7	1.7	97.0
5 YEARS	6.	2	.9	.9	97.9
6 YEARS	7.	2	.9	.9	98.7
7 YEARS	8.	1	.4	.4	99.1
8 YEARS	9.	1	.4	.4	99.6
10 YEARS OR MORE	11.	1	.4	.4	100.0
	0	1	.4	MISSING	100.0
		-----	-----	-----	-----
	TOTAL	234	100.0	100.0	

VALID CASES

233

MISSING CASES

1

BEST AVAILABLE COPY

10/28/77

FILE - NONAME - CREATED 10/28/77

## Q6 FORMAL EDUCATION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
SOME HS	3.	3	1.3	1.3	1.3
HS GRAD	4.	57	24.4	24.4	25.6
TRADE SCH	5.	5	2.1	2.1	27.8
SOME COLLEGE	6.	124	53.0	53.0	80.8
COLLEGE DEGREE	7.	27	11.5	11.5	92.3
SOME GRAD WORK NO MS R.		13	5.6	5.6	97.9
MASTER DEGREE	9.	4	1.7	1.7	99.6
POST GRAD WORK	10.	1	.4	.4	100.0
TOTAL		234	100.0	100.0	

VALID CASES

234

MISSING CASES

0

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10/28/77

FILE - VONAME - CREATED 10/28/77

Q7 PME

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NONE	1.	13	5.6	5.6	5.6
NCO LDP SCH	2.	14	6.0	6.0	11.6
NCO ACADEMY	3.	190	81.2	81.5	93.1
OTHER	4.	16	6.8	6.9	100.0
	0	1	.4	MISSING	100.0
	TOTAL	234	100.0	100.0	
VALID CASES	233	MISSING CASES	1		

10/23/77

FILE - NONAME - CREATED 10/26/77

## Q8 UNIT LEVEL ASSIGNED TO

CATEGORY LABEL	CASE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	SUM FREQ (PCT)
DETACHMENT	1.	14	6.0	6.0	6.0
SQUADRON	2.	96	41.0	41.0	47.0
BASE	3.	6	2.6	2.6	49.6
GROUP	4.	20	8.5	8.5	53.1
WING	5.	35	15.0	15.0	73.1
AIR DIV	6.	1	.4	.4	73.5
NAF	7.	15	6.4	6.4	79.9
MAJ COM	8.	32	13.7	13.7	93.6
HO USAF	9.	3	1.3	1.3	94.9
OTHER	10.	12	5.1	5.1	100.0
	TOTAL	234	100.0	100.0	

VALID CASES

234

MISSING CASES

0

10/28/77

FILE - NONAME - CREATED 10/28/77

## Q9 EXPERIENCE AT UNIT LEVEL

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
LESS THAN 1 YEAR	1.	21	9.0	9.0	9.0
1 YEAR	2.	38	16.2	15.3	25.3
2 YEARS	3.	26	11.1	11.2	36.5
3 YEARS	4.	17	7.3	7.3	43.8
4 YEARS	5.	13	5.6	5.6	49.4
5 YEARS	6.	12	5.1	5.2	54.5
6 YEARS	7.	15	6.4	6.4	60.9
7 YEARS	8.	10	4.3	4.3	65.2
8 YEARS	9.	12	5.1	5.2	70.4
9 YEARS	10.	1	.4	.4	70.8
10 YEARS OR MORE	11.	58	29.1	29.2	100.0
	0	1	.4	MISSING	100.0
		-----	-----	-----	
	TOTAL	234	100.0	100.0	

VALID CASES

233

MISSING CASES

1

10/28/77

FILE - NONAME - CREATED 10/28/77

## Q10 MOST NUMBER OF PEOPLE EVER SUPERVISE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
LESS THAN 10	1.	37	15.8	15.8	15.8
10 TO 20	2.	41	17.5	17.5	33.3
20 TO 30	3.	29	12.4	12.4	45.7
30 TO 40	4.	19	8.1	8.1	53.8
40 TO 50	5.	24	10.3	10.3	64.1
50 TO 60	6.	3	1.3	1.3	65.4
60 TO 70	7.	15	6.4	6.4	71.8
70 TO 80	8.	10	4.3	4.3	75.1
80 TO 90	9.	6	2.6	2.6	78.6
90 TO 100	10.	10	4.3	4.3	82.9
100 OR MORE	11.	40	17.1	17.1	100.0
	TOTAL	234	100.0	100.0	

VALID CASES

234

MISSING CASES

0

10/28/77

FILE - NONAME - CREATED 10/28/77

011 NUMBER OF AFSC

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
1	1.	88	37.6	37.6	37.6
2	2.	91	38.9	38.9	76.5
3	3.	36	15.4	15.4	91.9
4	4.	12	5.1	5.1	97.0
5	5.	5	2.1	2.1	99.1
7	7.	2	.9	.9	100.0
	TOTAL	234	100.0	100.0	

VALID CASES

234

MISSING CASES

0

10/28/77

FILE - NONAME - CREATED 10/28/77

## Q12 AGE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	SUM FREQ (PCT)
35 OR LESS	1.	30	12.9	12.9	12.9
36	2.	20	8.5	8.5	21.5
37	3.	23	9.8	9.9	31.3
38	4.	16	6.8	6.9	39.2
39	5.	38	16.2	15.3	54.5
40	6.	34	14.5	14.6	59.1
41	7.	32	13.7	13.7	82.8
42	8.	16	6.8	6.9	89.7
43	9.	11	4.7	4.7	94.4
44	10.	3	1.3	1.3	95.7
45	11.	3	1.3	1.3	97.0
46	12.	4	1.7	1.7	98.7
47	13.	2	.9	.9	99.6
48 OR OLDER	14.	1	.4	.4	100.0
	0	1	.4	MISSING	100.0
TOTAL		234	100.0	100.0	

VALID CASES 233 MISSING CASES 1

**APPENDIX B**

**NCO Decision Making Exercise**

## APPENDIX B

The following is the Senior NCO Decision Making Exercise that was used to gather the data for this study. Only one of the 32 hypothetical jobs is included in this appendix.

USAF SCN 77-124  
Expires 31 December 1977

SENIOR NCO DECISION-MAKING EXERCISE

(Air Force Institute of Technology Research Study)

This study is designed to investigate your decision-making behavior. Please respond frankly to the inquiries that are made of you. You will not be identified with the data in the final report and your participation in the study will be kept confidential. Your cooperation is urged in order that we may learn more about the decision-making behavior of the senior leaders of the Air Force's enlisted ranks.

The study is divided into three sections. Section I involves general information, Section II involves a short questionnaire, and Section III involves a decision-making exercise. The data gathered will be used to formulate statistical models that allow the researcher to test hypotheses about leadership decision-making behavior. The results will be summarized in a Masters thesis to be written by an Air Force officer studying at the Air Force Institute of Technology.

Thank you for your participation.

## PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority

(1) 5 U.S.C. 301, Departmental Regulations: and/or

(2) 10 U.S.C. 80-12, Secretary of the Air Force, Powers and Duties, Delegation by.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research based on the data provided, will be included in written Master's thesis and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or orally presented, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects to participate in any or all of this survey.

## SECTION I

### General Information

Please circle the response that is the most appropriate.

1. What command are you presently assigned to? (permanent assignment)

- |                                   |  |
|-----------------------------------|--|
| A. Alaskan Air Command            | N. AF Data Automation Agency           |
| B. U.S. Air Force Academy         | O. Headquarters Command                |
| C. Aerospace Defense Command      | P. Military Airlift Command            |
| D. U.S. Air Forces in Europe      | Q. Pacific Air Forces                  |
| E. AF Accounting & Finance Center | R. Strategic Air Command               |
| F. AF Logistics Command           | S. Tactical Air Command                |
| G. AF Systems Command             | U. AF Military Personnel Center        |
| H. Air Reserve Personnel Center   | V. AF Inspection & Safety Center       |
| I. Air Training Command           | W. Air Force Audit Agency              |
| J. Air University                 | X. AF Office of Special Investigations |
| K. U.S. Air Forces Southern Cmd   | Y. Other _____                         |
| L. HQ Air Force Reserve           |  |
| M. HQ USAF                        |  |

2. How long have you been in the military?

- |                              |                              |
|------------------------------|------------------------------|
| A. Less than 10 years        | L. 20 years but less than 21 |
| B. 10 years but less than 11 | M. 21 years but less than 22 |
| C. 11 years but less than 12 | N. 22 years but less than 23 |
| D. 12 years but less than 13 | O. 23 years but less than 24 |
| E. 13 years but less than 14 | P. 24 years but less than 25 |
| F. 14 years but less than 15 | Q. 25 years but less than 26 |
| G. 15 years but less than 16 | R. 26 years but less than 27 |
| H. 16 years but less than 17 | S. 27 years but less than 28 |
| I. 17 years but less than 18 | T. 28 years but less than 29 |
| J. 18 years but less than 19 | U. 29 years but less than 30 |
| K. 19 years but less than 20 | V. 30 years or more          |

3. What is your present grade?

- |                          |  |
|--------------------------|--|
| A. E-9                   |  |
| B. E-8                   |  |
| C. E-7                   |  |
| D. Other _____ (Specify) |  |

4. How long have you been in your present grade?

- A. Less than 1 year
- B. 1 year but less than 2
- C. 2 years but less than 3
- D. 3 years but less than 4
- E. 4 years but less than 5
- F. 5 years but less than 6
- G. 6 years but less than 7
- H. 7 years but less than 8
- I. 8 years but less than 9
- J. 9 years but less than 10
- K. 10 years or more

5. What is your highest level of education? (include GED)

- A. Grammar school (did not graduate)
- B. Grammar school graduate
- C. High school (did not graduate)
- D. High school graduate
- E. Trade or technical school
- F. College (did not graduate)
- G. College degree
- H. Graduate work (no master's degree)
- I. Master's degree
- J. Postgraduate work beyond master's degree (no doctorate)
- K. Doctorate degree

6. How much previous Professional Military Education have you completed?

- A. None
- B. NCO Leadership School
- C. NCO Academy
- D. Other (Specify) \_\_\_\_\_

7. What unit level are you presently assigned to?

- A. Detachment
- B. Squadron
- C. Base
- D. Group
- E. Wing
- F. Air Division
- G. Numbered Air Force
- H. Major Command
- I. Headquarters USAF
- J. Other (Specify) \_\_\_\_\_

8. How much total experience do you have at the unit level that you are presently assigned to?

- A. Less than 1 year
- B. 1 year but less than 2
- C. 2 years but less than 3
- D. 3 years but less than 4
- E. 4 years but less than 5
- F. 5 years but less than 6
- G. 6 years but less than 7
- H. 7 years but less than 8
- I. 8 years but less than 9
- J. 9 years but less than 10
- K. 10 years or more

9. What is the largest number of people that you have ever had under your supervision?

- |                        |                         |
|------------------------|-------------------------|
| A. Less than 10        | G. 60 but less than 70  |
| B. 10 but less than 20 | H. 70 but less than 80  |
| C. 20 but less than 30 | I. 80 but less than 90  |
| D. 30 but less than 40 | J. 90 but less than 100 |
| E. 40 but less than 50 | K. 100 or more          |
| F. 50 but less than 60 |                         |

10. How many different AFSC's have you had? (Neglect upgrades & Suffixes)

- |      |               |
|------|---------------|
| A. 1 | F. 6          |
| B. 2 | G. 7          |
| C. 3 | H. 8          |
| D. 4 | I. 9          |
| E. 5 | J. 10 or more |

11. How old are you?

- |               |                |
|---------------|----------------|
| A. 35 or less | L. 46          |
| B. 36         | M. 47          |
| C. 37         | N. 48          |
| D. 38         | O. 49          |
| E. 39         | P. 50          |
| F. 40         | Q. 51          |
| G. 41         | R. 52          |
| H. 42         | S. 53          |
| I. 43         | T. 54          |
| J. 44         | U. 55          |
| K. 45         | V. 56 or older |

## SECTION II

### Questions

The questions presented in this section allow you to indicate the extent to which you feel certain factors presently exist in your current (or most recent if you are between stations) job. These questions also allow you to indicate the extent to which you feel these same factors should exist. Please indicate how you feel about these factors. Naturally, there are no "correct" or "incorrect" answers. Answer the questions in order. Do not change your answer once you have made your selection.

THE OPPORTUNITY TO CONTINUE YOUR PERSONAL GROWTH AND DEVELOPMENT.

12. How much of this factor is there now in your worklife?

1	2	3	4	5	6	7
none			some			a lot

13. How much of this factor do you think should be in your worklife?

1	2	3	4	5	6	7
none			some			a lot

14. How important is it to you to have this factor present in your worklife?

1	2	3	4	5	6	7
none			some			a lot

-----

THE OPPORTUNITY TO MEET REGULARLY WITH YOUR FELLOW WORKERS TO EXCHANGE THOUGHTS AND IDEAS.

15. How much of this factor is there now in your worklife?

1	2	3	4	5	6	7
none			some			a lot

16. How much of this factor do you think should be in your worklife?

1	2	3	4	5	6	7
none			some			a lot

17. How important is it to you to have this factor present in your worklife?

1	2	3	4	5	6	7
none			some			a lot

THE OPPORTUNITY TO PARTICIPATE IN DETERMINING THE METHODS AND PROCEDURES THAT ARE USED IN THE WORK.

18. How much of this factor is there now in your worklife?

1	2	3	4	5	6	7
none			some			a lot

19. How much of this factor do you think should be in your worklife?

1	2	3	4	5	6	7
none			some			a lot

20. How important is it to you to have this factor present in your worklife?

1	2	3	4	5	6	7
none			some			a lot

---

A FEELING OF SECURITY BASED ON YOUR FAMILIARITY WITH THE DETAILS OF YOUR JOB.

21. How much of this factor is there now in your worklife?

1	2	3	4	5	6	7
none			some			a lot

22. How much of this factor do you think should be in your worklife?

1	2	3	4	5	6	7
none			some			a lot

23. How important is it to you to have this factor present in your worklife?

1	2	3	4	5	6	7
none			some			a lot

A FEELING OF ESTEEM BECAUSE OF HOW YOUR JOB IS REGARDED BY YOUR FELLOW WORKERS.

24. How much of this factor is there now in your worklife?

1	2	3	4	5	6	7
none			some			a lot

25. How much of this factor do you think should be in your worklife?

1	2	3	4	5	6	7
none			some			a lot

26. How important is it to you to have this factor present in your worklife?

1	2	3	4	5	6	7
none			some			a lot

### SECTION III

#### Decision-Making Exercise

This section consists of a decision-making exercise. During this exercise, you should assume that you have been notified that you are being transferred. A number of new jobs are available to you. Each of these jobs offers the same general benefits such as salary, geographical location, and so forth, and you should assume that these jobs do not differ in these areas. The only real difference in these jobs relate to the information that is presented to you in each instance about five key factors. Using only this information, you are asked to judge the desirability of each of these jobs from your viewpoint. Remember, there are no "correct" or "incorrect" decisions, so work at a moderate pace as you make your decisions. Make your decisions in the order in which the cases are presented. Do not change your answer once you have made your selection.

JOB #1

does not provide you the opportunity to continue your personal growth and development.

does involve meeting regularly with your fellow workers to exchange thoughts and ideas.

does not allow you to participate in determining the methods and procedures that are used in the work.

does not give you a feeling of security based on your familiarity with its details.

does not give you a feeling of esteem because of how it is regarded by your fellow workers.

INDICATE HOW DESIRABLE YOU CONSIDER THIS JOB TO BE:

1	2	3	4	5	6	7
very undesirable			indifferent			very desirable

**APPENDIX C**

**FORTRAN Programs**

## APPENDIX C

The following are the FORTRAN programs that were used in this study. Program EXPAND expanded the raw data to include the predictor variables for regression analysis and analysis of variance. A zero was used for a cue not being present and a one was used for a cue being present.

Program COEFF was used to perform a regression analysis on the set of decisions of each subject. The program did 234 regression analyses. The results of each regression analysis was transferred into relative weights and these were recorded on permanent file.

```
PROGRAM EXPANO(INPUT,OUTPUT,TAPE2,TAPE1)
DIMENSION IBUF (26), IDEC(32)
DIMENSION IVEC(32)
DATA IVEC/5H01000,5H00000,5H10011,5H01101,5H10111,5H10100,
1 5H00110,5H01111,5H10010,5H11011,5H00001,5H11100,5H00011,
2 5H01100,5H01011,5H00010,5H11111,5H10000,5H00100,5H00111,
3 5H00101,5H11110,5H01110,5H01001,5H10101,5H01010,5H10001,
4 5H11101,5H11001,5H11000,5H11010,5H10110/
REWIND 1
N=0
100 READ(2,10) ID,IBUF,IDECK
10 FORMAT(I2,11A1,15I1,32I1)
IF(EOF(2).NE.0) GO TO 900
N=N+1
DO 200 I=1,32
IF(IBUF (I).EQ.0) IBUF(I)=0
IF(IDECK (I).EQ.0) IDECK(I)=0
WRITE(1,20) N,IBUF,IDECK(I),IVEC(I)
20 FORMAT(I3,11A1,15I2,I2,A5)
200 CONTINUE
GO TO 100
900 STOP
END
```

```

PROGRAM COEFF(INPUT,OUTPUT,TAPE1,TAPE2)
DIMENSION IBUF(15),XP(5,32),Y(32),COEF(5)
N=0
REWIND 1
REWIND 2
C   XPFAC IS STD DEV OF X
XPFAC=SQRT(8./31.)

100  YS=YS2=0.
DO 200 J=1,31
READ(1,10) IBUF,Y(J),(XP(I,J),I=1,5)
10  FORMAT(A3,11A1,3A10,F2.0,5F1.0)
IF.EOF(1).NE.0) GO TO 900
YS=YS+Y(J)
YS2=YS2+Y(J)**2
200 CONTINUE
READ(1,10) IBUF,Y(32),(XP(I,32),I=1,5)
DO 150 I=2,12
IF(IBUF(I).EQ.1H )IBUF(I)=0
IBUF(I)=SHIFT(IBUF(I),-54)
150 CONTINUE
YS=YS+Y(32)
YS2=YS2+Y(32)**2
N=N+1
C   CALCULATE MEAN,STD. DEV. OF CRITERION (DECISION)
YMFAN=YS/32.0
SSY=YS2-(YS**2)/32
SIGY=SORT(SSY/31)
C   CALCULATE STANDARDIZED COEFFICIENTS
DO 300 I=1,5
300 COEF(I)=0.
DO 400 J=1,32
DO 400 I=1,5
    COEF(I)=COEF(I)+((XP(I,J)-.5)/XPFAC)*((Y(J)-YMEAN)/SIGY)
400 CONTINUE
SSR=0.0
DO 500 I=1,5
    COEF(I)=((1/31.)*COEF(I))**2
500 SSP=SSP+COEF(I)
DO 600 I=1,5
600 COFF(I)=COEF(I)/SSR
C   OUTPUT LAST RECORD IN SET, AND ADD COEFF. AND RSQ
WRITE(2,30) IBUF,COEF,SSR
30  FORMAT(A3,11I2,3A10,6F6.4)
GO TO 100
900 PRINT*, "NO. OF RESPONDENTS=",N
STOP
END

```

VITA

Richard L. Lamontagne was born in Sanford, Maine on 18 September 1950. He attended the Catholic University of America in Washington, D.C. from 1968 to 1972 and graduated with a Bachelor of Science Degree in Engineering. Upon graduation, he was commissioned through the Reserve Officer Training Corps Program and was initially assigned to the Aero-nautical Systems Division, Wright-Patterson Air Force Base, Ohio. While there, he worked as a structural engineer supporting various weapon systems. Subsequent to that assignment, he was assigned to the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio as a resident student in Graduate Systems Management.

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